

Muddy River Bridge
0.24 miles northeast of the
junction of I-15 and SR 168
Glendale Junction
Clark County
Nevada

HAER No. NV-7

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Western Region
Department of the Interior
San Francisco, CA 94102

HISTORIC AMERICAN ENGINEERING RECORD

MUDDY RIVER BRIDGE

HAER No. NV-7

Location: Frontage Road 419 spanning the Muddy River
0.24 miles northeast of the junction of I-15 and SR 168
Glendale Junction, Clark County, Nevada

U.S.G.S. 7.5. minute Moapa East, Nevada, quadrangle,
Universal Transverse Mercator coordinates:
11.717140, 4060080

Date of Construction: 1932-1933

Engineer: George Egan and S. C. Durkee

Builder: James J. Burke and Co., Salt Lake City, Utah

Present Owner: Nevada Department of Transportation
1263 South Stewart Street, Carson City, Nevada 89712

Present Use: Vehicular Bridge
To be demolished 1987

Significance: The Muddy River Bridge is the best example of a thru "pony"
truss bridge in Nevada. It is one of six truss bridges
(three of which are pony trusses) still on the NDOT
inventory. This construction type has been very rare in
Nevada. The bridge was a vital crossing point along Old
US 91, the main transportation route from Southern Nevada to
Utah.

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Date: March 1985

HISTORICAL NARRATIVE - MUDDY RIVER BRIDGE

DESCRIPTION

The Muddy River Bridge (N.D.O.T. number B-81) is a two span Warren pony truss bridge. Each span, consisting of two trusses, is 80.0' in length. The total length of B-81 is 166' 4 1/2". As constructed this two lane bridge provides for 24.0' of roadway width curb to curb. The deck width to the outside of the trusses is 26.8'. An 8" poured concrete reinforced deck rests on steel stringers and floor beams which tie the trusses together. Asphalt 3" thick covers the concrete deck. The entire structure is held together with 3/4" rivets, except the railing which uses 5/8" rivets to hold it in place. Steel gussets of 3/8" plate are used to reinforce the trusses at critical points.

To allow for expansion, up to 2" per span in the desert heat, each span rests on four steel rockers, one at each corner. These rockers are 1'2" along the bearing surface (in the plane of rocker movement) by 2' in width. The rockers at the pier ends are fixed in that they do not move. The bridge expands towards the abutments and the rockers (set on steel plates) move on a 12" radius.

The two trusses are supported by concrete abutments and a center pier. Depending on the silt level and seasonal precipitation in the Muddy River the bottom of the structure is 25-35' above the water. Each concrete reinforced abutment rises 29' above two 10'6" x 13' footings. The footings for the abutments are poured around twenty 12" in diameter timber logs which were driven approximately 15' into the ground. The center pier is over 32' high and rests on two hexagonal footings anchored by nineteen 12" in diameter logs. Both concrete abutments and piers are heavily reinforced with steel bars.

CONSTRUCTION

Contract 299 was awarded to James J. Burke & Company for the construction of the Muddy River Bridge on September 28 of 1932. The bid that won the contract for Burke & Company was for \$36,543.30. The construction was carried out over the fall and winter of 1932-1933. Completion of the project from the award date came in just over five and one half months on May 16, 1933.

Construction of this bridge undoubtedly posed some interesting problems. The Muddy River runs year-round and normally is a very placid stream in the arid Nevada desert. Yet B-81 is located just southeast (refer to Site Location Map) of the intersection of the Muddy River and the Meadow Valley Wash. These two channels drain several hundred square miles of the upper Moapa Valley. Precipitation in the desert is often deposited in very short periods of time and the runoff can be quite spectacular. In addition, the soils along the banks and bottom of the Muddy River are very unstable sand and silt. The design of the bridge called for large abutments and a pier to be placed in the

stream channel. Working in the winter, a normally dry period, gave the best odds for avoiding a flash flood which could have destroyed the unfinished concrete substructure.

While no records exist to verify the exact timing of construction events, the following is the most likely sequence. The order for the structural steel was undoubtedly placed with the Virginia Bridge and Iron Co. of Roanoke, Virginia after the contract was awarded. The records of N.D.O.T. (then known as the Nevada Highway Department) indicate that the Virginia Bridge and Iron Co. subcontracted to the Carnegie Steel Works in Pittsburgh, Pennsylvania for the main structural steel.

Before the main structure arrived, Burke & Co. started construction of the abutments and pier. We know that the falsework for the abutments was above the level of the river at the time of construction. The construction of the pier required that two steel "sheet pile caissons" be sunk into the river channel. These caissons were pumped dry, the timber pilings were driven into place and then concrete was poured into the caissons. It is noted that a steam powered derrick for driving piles from "swinging leads" was erected on the bank of the river next to the abutments. This derrick was also used for erecting the steel superstructure.

With the concrete abutments and piers in place (or close to completion) the steel arrived from the Virginia Bridge and Iron Co. As the route for the Union Pacific RR passes within a mile of the construction site it is probable that the steel was delivered as close as possible to the job. A total of 237,000 lbs. of steel was used in B-81. Trucking this amount of steel 50 miles from Las Vegas over poor roads seems impractical given the proximity of the railroad. With the arrival of the steel, workmen would have put each assembled truss in place and tied them together with the transverse beams and floor stringers. When each span was completely assembled the concrete floor would have been poured and finish detailing completed.

PEOPLE INVOLVED WITH B-81

We know that James J. Burke & Co. of Salt Lake City, Utah constructed the Muddy River Bridge. A check of Department records from contract no. 1 in 1919 to contract no. 612 in 1940 indicates that Burke & Co. were awarded no more contracts for work on Nevada's highways. During the early years, it was not unusual for companies from Utah to come into Nevada and build projects. Utah and the Salt Lake area were well developed compared to Southern Nevada at this time. The ties between Utah and Southern Nevada have historically been very strong due to the expansion of the Mormons into the area.

The construction resident for this project was a Mr. H. A. Squires of the Nevada Highway Department. Not much of Mr. Squires is known except that B-81 appears to have been the second job on which he was the construction resident. Mr. Squires' name shows up as resident on numerous contracts across Nevada for a number of years after the construction of B-81.

The Department, which designed the bridge, was under the direction of the State Highway Engineer, Mr. S. C. Durkee. The Chief Draftsman in the bridge section was a Mr. George Egan. The Highway Department was a much less formal and bureaucratic operation in the 1930's than it is today. The final design for the Muddy River Bridge was likely the work of a number of engineers under the direction of Mr. Egan with final approval given by Mr. Durkee.

The construction workers who built B-81 are known to have been caucasian, because we have a very faded picture in our files of the workmen. These men are likely from Utah, the home base of James J. Burke & Co. Most businesses at this time in Utah were controlled by members of the Mormon Church. It would be highly unlikely that the construction crew would have had any ethnic group members. If the crew came from Utah, or the surrounding community, then it is likely they were also Mormons.

TECHNOLOGY AND DESIGN

Nevada has used very few steel truss bridges along its highways. While the steel truss was a mainstay in railroad engineering, timber, concrete and steel beam bridges were used in most cases by the Highway Department. The "Warren" truss is a design type which dates back to the mid 19th century. By the time the design was selected for use in spanning the Muddy River, there existed many more advanced forms of bridge types.

The consensus of current engineers within N.D.O.T.'s bridge design section is that there are two reasons for the selection of a truss bridge across the Muddy River. The first is weight. The soils along the banks of the Muddy River are very poor. A concrete bridge of similar size to the truss design used, would have been significantly heavier than B-81. As a result, the settling of abutments and piers would have been greater than that experienced with the truss design. A heavier bridge would have required much more massive supports and again this would have contributed to its weight. This hypothesis is given credence because maintenance reports on B-81 since the 40's have noted tilting and settling of the abutments due to poor soil conditions.

A second factor influencing design are the construction problems associated with building a concrete structure. To support the forms for a poured concrete bridge a massive falsework must be erected. This is a very complex, costly and time consuming procedure. It would have taken much longer than five and one half months to erect a concrete bridge across the Muddy River. Finally, there would have been a number of serious engineering problems associated with erecting a falsework on the unstable bottom of the Muddy River. These problems would have taxed the ingenuity of regional small bridge builders in 1930's Nevada.

The designers of the Muddy River Bridge came up with a unique solution to the problem at hand. They chose a design type common in the United States but

very rarely used in Nevada. The trusses and all structural steel were contracted out to proven fabricators. A small construction company working at a difficult construction site built the abutments and piers with excellent results. The superstructure was erected and construction completed in less than six months. The bridge has been in continuous use for 53 years and its construction cost will be a fraction of the funds needed to remove the structure.

HISTORICAL SITE LOCATION

The Muddy River Bridge is located in an area which is the crossroads of several regional transportation systems (see Site Location Map). Both the railroad and the highway cluster together at this point because of topography and drainage systems. The Muddy River Bridge was built just a few hundred feet southeast of the point where the Meadow Valley Wash enters the Muddy River. This area is also the place where the generally north trending Meadow Valley meets the east trending upper Moapa Valley. The lower Moapa Valley trends southeast and both valleys resemble a "Y" tipped to the west. South of the bridge location are the rugged North Muddy Mountains. To the north the Mormon Mesa rises 150 meters above the valley floor.

Within a few miles of the site of B-81 the Union Pacific RR tracks follow the floor of Moapa Valley to the southeast. Interstate 15 follows the route of old US 91 northeast into Utah. State Route 168 heads northwest to the farming and ranching communities of the upper Moapa Valley and SR 169 heads south to Logandale and the lower Moapa Valley. Glendale Junction is located across the Muddy River bridge and it has for years been a rest stop, refueling point and repair station for travelers through the area.

HISTORICAL BACKGROUND

The center of population and economic activities in Southern Nevada has always been the Las Vegas Valley. Long before this broad valley became a resort mecca, the area was an oasis for travelers through the area. For travel between Southern Nevada and Utah the historic trails and modern Interstate follows a route northeast across a point where the Muddy River Bridge was constructed. Today the Interstate crosses the Muddy River, using two concrete structures, only a few hundred feet south of B-81.

The plans for a national highway network began to take place in the early 1900's with the realization that travel by motorcar would take on vast importance in the development of the United States. US 91, the "Arrowhead Trail" highway was the main route into Utah from Las Vegas. This route was one of seven major primary arteries that crossed Nevada north to south, east to west and linked it to all of the neighboring states.

The strong historical ties to Utah made a reliable transportation route into the area vital at the beginning of the century. Problematic in the

construction of a highway into Utah was crossing the two major drainages in Nevada along the route. The Muddy River and the Virgin River were prone to treacherous bottoms and serious flooding. In addition, the Mormons who settled Southern Nevada had come down the river valleys and settled the good farm land along the Muddy and Virgin Rivers. The economies of both states were tied closely to ranching and farming in these early years and reliable transportation was a key to growth. Finally, the military realized that travel across the "desert" west was difficult. The military installations in Southern California had to be tied to the rest of the country by a strategic road inland.

US 91 was constructed in many segments from Las Vegas to the Utah border. Graded trails were replaced by gravel roads. As oiling and "desert mix" technologies became available the road slowly took on a modern look. As part of general upgrading the Muddy River Bridge was constructed in 1932-33 as a reliable crossing point on the Muddy River. The steel truss structure replaced a wooden bridge of a smaller size. After installation B-81 served as a vital link from Southern Nevada to Utah until the mid 1960's when the Interstate was completed. In addition to all interstate traffic being routed across the bridge for some 30 years, B-81 was vital to farm to market activities of local ranchers and farmers. The Department's records indicate that the Muddy River Bridge was crested by flood water about once a decade since construction. When the water subsided, Department crews cleaned the debris from the bridge and traffic was once again on the move.

